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CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 20 December 2002 with an application for Letters Patent number 523377 made by CADBURY CONFECTIONERY LIMITED.

Dated 21 November 2003.

Neville Harris
Commissioner of Patents, Trade Marks and Designs

COMMISSIONER OF PATENTS, TRADEMARKS & DESIGNS
NEW ZEALAND

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Patents Form No. 4

Our Ref: MK504184

Patents Act 1953

PROVISIONAL SPECIFICATION

CHILLER UNIT

We, **CADBURY CONFECTIONERY LIMITED,** a New Zealand company, of 494 Rosebank Road, Avondale, New Zealand do hereby declare this invention to be described in the following statement:

PT0422732

CHILLER UNIT

Technical Field of the Invention

The invention relates generally to refrigeration units. More specifically, the invention provides an open topped refrigeration unit particularly for consumable products but not solely for such products.

Background to the Invention

Refrigeration devices are extensively used in the food industry to extend the life of consumables and to avoid substantial deterioration of consumables.

Limited space in retail stores has led to a drive in recent years to provide compact refrigeration units in an attractive structure. WO 02/39854 illustrates one form of refrigeration display for consumables such as food and beverages. An essential feature of cooling devices such as that disclosed in WO 02/39854 is a conductive shell formed from aluminium which encircles the inner compartment. A heat transfer block at the base of the inner compartment is in contact with the conductive shell providing cooling of the inner compartment. In WO 02/39854, cold air created within the conductive shell is then circulated within the device via vents, channels in the walls, and a fan. The device shown in WO 02/39854 also uses a lid to separate the internal environment from the external environment.

The ability to display the products contained in the unit for immediate customer access is also desirable. Covers, doors, and the like impact on customer access and also customer appeal. Australian Patent No. 606839 (AU 606839) discloses a large island-type refrigeration display cabinet. The internal environment of the cabinet is isolated from the external environment by an air curtain, and as such a top or lid is not needed. Chilled air circulates around the internal compartment of the cabinet through channels in the cabinet walls.

While reference has been made to a number of documents in the background to the present information, no admission is made that any document constitutes prior art or forms part of the common general knowledge in the art in New Zealand or any other country.

Object of the Invention

It is an object of the invention to provide the public with useful alternatives to known devices.

Other objects of the invention will become apparent from the following description which is given by way of example only with reference to any one of the Figures.

Summary of the Invention

In one aspect, the invention provides an open topped refrigeration unit including an outer case having internal walls and a base panel defining an internal compartment, a refrigerated air generator, a duct, and a skirt, wherein the duct directs chilled air generated by the refrigerated air generator around the internal compartment and wherein the skirt is adapted to frame the open top of the internal compartment and to direct the chilled air flow into the internal compartment.

Preferably the refrigeration unit includes a support tray having walls including vents wherein the vents are adapted to direct chilled air flow.

Preferably the internal compartment is divided into smaller substantially separate compartments by the duct, base panel, internal walls, and support tray, and wherein chilled air flows in a predetermined direction through the separate compartments.

Preferably the base panel supports the duct and the duct supports the support tray.

Preferably the internal walls of the outer case have an internal profile adapted to cooperatively engage with the support tray to direct chilled air flow.

Preferably the skirt is provided as a profiled surface which further directs chilled air flow in the predetermined direction.

Preferably the support tray accommodates products to be stored in the refrigeration unit.

Preferably the refrigeration unit has a front, back and two side walls, the two side walls each having a recess extending from a position adjacent the back wall to adjacent the front wall, the recesses adapted to co-operate with the vents in the side walls of the support tray, the refrigerated air generator being positioned in the back wall and the duct being adapted to direct the chilled air from the refrigerated air generator against the two side walls such that the chilled air flows through the recesses and the vents in the side walls of the support tray.

Preferably the front wall has a recess extending from positions adjacent to the respective side walls, the recess adapted to co-operate with vents in the front wall of the support tray to direct chilled air to the compartment beneath the support tray.

Preferably the refrigerated air generator is a thermoelectric unit.

Preferably the refrigerated air generator is a micro-compressor.

Preferably the refrigerated air generator can recycle relatively warmer air (with respect to the generated chilled air) from the internal compartment to generate chilled air.

Preferably the support tray includes a removable wire rack and/or a stippled surface across the support tray.

Preferably the refrigerator unit includes a display panel or panels, and/or dividers on the support tray, for display of promotional material.

Preferably the refrigeration unit includes a drain tray to receive and collect drips generated from the operation of the refrigeration unit.

A method of refrigeration of an open topped refrigerator unit including:

- providing a outer refrigeration case which defines an internal compartment;
- generating and providing chilled air to the internal compartment; and
- circulating chilled air within the internal compartment only, in a predetermined direction such that the circulating chilled air within the compartment isolates the environment of the internal compartment from the external environment.

Preferably the internal compartment has walls having an internal profile which facilitate directing and circulating chilled air.

Preferably the internal compartment is divided into individual separate compartments wherein the division is adapted to direct the circulation of chilled air in a predetermined direction.

Preferably the separate compartments are connected such that chilled air flows from one compartment to the next in a predetermined direction.

Preferably chilled air is directed in the predetermined direction by a duct that directs chilled air flow to the side walls of the internal compartment, recesses in the side walls that are adapted to co-operate with vents on a support tray to direct chilled air flow to a skirt which frames the open top of the internal compartment and directs air flow back into the internal compartment.

Preferably chilled air is generated and provided to the internal compartment by a refrigerated air generator.

Preferably the refrigerated air generator is selected from a thermoelectric unit or a micro-compressor.

Other aspects of the invention will become apparent from the description below which is given by example only.

Detailed Description of the Figures

A preferred embodiment of the invention will now be described with reference to the accompanying Figures in which:

Figure 1 illustrates the preferred embodiment of the refrigeration unit of the current invention;

Figure 2 illustrates opposing side views of the refrigeration unit of Figure 1;

Figure 3 illustrates a back view of the refrigeration unit of Figure 1;

Figure 4 illustrates an exploded perspective view of the refrigeration unit of Figure 1; and

Figure 5 illustrates a cut-away profile view of the refrigeration unit of Figure 1 showing the predetermined direction which chilled air travels around the refrigeration unit.

Detailed Disclosure of the Invention

The present invention relates to an open topped refrigeration unit adapted for simple bench top use. The invention of the preferred embodiment has applications for storing medium to small products. Preferably the refrigeration unit is adapted to accommodate consumables such as confectionery products including chocolate bars. However, the refrigeration unit could also accommodate ice blocks, drinks, savoury meals, prepared sandwiches and the like.

Figure 1 illustrates a refrigeration unit 1 of the preferred embodiment. The refrigeration unit 1 includes an outer case 2 which creates an internal compartment 3. The internal compartment 3 is adapted to support and contain products in a cooled environment, substantially colder than the current exterior or ambient environment of the refrigeration unit 1. The outer case 2 is generally defined by side walls 4, 5, front wall 6 and back wall 7 (obscured in Figure 1). The outer case 2 will be described with reference to Figures 2 and 3.

The refrigeration unit 1 has an upper portion 8 and a lower portion 9.

The upper portion 8 provides access to the internal compartment 3. As can be seen from Figure 1, the upper portion 8 of the present invention is open and has the advantage of not requiring a lid or door to separate the environment of the internal compartment 3 from the external or ambient environment. This enables consumers to easily see and access the products stored within the internal compartment 3 without needing to open a lid or door, and replacing the lid or door after selecting the desired product from the internal compartment 3.

It will be appreciated that a top or lid could be fitted to the refrigerated unit 1, if needed, for security or reasons other than relating to the refrigeration purposes. Furthermore, a lid could be fitted where the operation of the refrigeration unit 1 is adversely affected by an extreme environment, such as extreme heat above about 40°C.

The upper portion 8 of the refrigeration unit 1 includes a skirt 10 which borders and encircles the internal compartment 3 formed by outer case 2. The skirt 10 is provided with a profiled surface (best seen in Figures 2 and 4) adapted to direct chilled air within the internal compartment 3 towards products stored within the internal compartment 3. In this way, the upper portion 8 of refrigeration unit 1 can remain open while maintaining a chilled environment in the internal compartment 3 without the requirement for a lid or door isolating the internal compartment 3. A chilled air curtain is created at the surface of internal compartment 3 isolating the environment created from the external environment.

The skirt 10 shown in Figure 1 is formed from a translucent plastics material. However, this is not essential. The skirt 10 may be provided as a coloured surface or be formed of other firm materials such as aluminium, steel or the like. The advantage of having a translucent plastic skirt includes ease of manufacture. Further advantages include the benefit obtained by consumers standing at an angle to the refrigeration unit 1 who may immediately see the products contained within the refrigeration unit 1 through the transparent skirt 10. Also, a transparent skirt may add to the overall look of the refrigerated unit 1 to create an attractive appearance.

The skirt 10 is designed to optimise viewing of all products sitting inside the chiller unit, allow access to the products accommodated within the refrigeration unit 1, and to optimise the air curtain over the products inside the refrigeration unit 1. It will be understood that the skirt could be formed integrally with walls 4, 5, 6. However, this is a less desirable option in terms of ease of production of the refrigeration unit 1 and could interfere with consumer awareness of the products held in the refrigeration unit 1.

The refrigeration unit 1 also includes a promotional display portion 11. This can be used to advertise the products contained within the refrigeration unit 1, price and other marketing or consumer information which may be appropriate. It will, however, be appreciated that the display portion 11 is not an essential requirement of the invention or the overall working of the invention.

The internal compartment 3 includes dividers 12 which separate the products within the internal compartment 3. The dividers 12 may include price details of the products. Such options are also not essential but are preferred.

It will be appreciated that the size of the refrigeration unit 1 may be varied in accordance with the specific requirements for a particular refrigeration unit 1. However, in order to provide a portable and/or bench top refrigeration unit 1, the size will range from 540mm wide x 550mm deep x 300mm high to 750mm wide x 750mm deep x 400mm high. A preferred size for the refrigeration unit 1 is about 540mm wide x 595mm deep x 395mm high.

Figure 2 illustrates opposing side views of the refrigeration unit of Figure 1. As previously mentioned, the outer case 2 includes side walls 4, 5. Side wall 4 includes external upper edge 13 and lower edge 17, whilst side wall 5 includes external upper edge 14 and lower edge 18.

External upper edges 13, 14 of side walls 4, 5 respectively are arched which has the effect of arching side walls 4, 5 from back wall 7 to front wall 6. The surface of side walls 4, 5 are also aesthetically shaped around the upper edges 13, 14 and at rear surfaces 15, 16. This arching and/or shaping is principally for improving the appearance of the refrigeration unit 1. However, the overall shape of side walls 4, 5 of the preferred embodiment provides some advantages to the circulation of chilled air within the internal compartment and thus optimises the energy efficiency of the refrigeration unit 1. It will be appreciated that the particular shape and arch of external upper edges 13, 14 and rear surfaces 15, 16 of side walls 4, 5 is not essential to the overall workings of the invention and may be modified as desired.

Lower edges 17, 18 of side walls 4, 5 respectively provide a straight surface to engage with a base panel 19 (obscured in Figure 2) which supports the refrigeration unit 1 as will be described below.

Skirt 10 can be clearly seen as a profiled surface in Figure 2. The profiled surface of skirt 10 is not uniform across the surface but is substantially wider at front end 10a, which engages with the front wall 6 then at rear end 10b.

Display portion 11 can also be seen as a substantially perpendicular extension from the upper portion 8. As mentioned above, display portion 11 is not essential.

Figure 3 illustrates the back of the refrigeration unit 1 of Figure 1. Side walls 4, 5 are adapted to engage with a base panel 19, back wall 7, and display portion 11.

The back wall 7 includes opening 20 adapted to co-operatively engage with a refrigerated air generator (best illustrated in Figures 4 and 5). The refrigerated air generator is adapted to provide chilled air to the internal compartment 3, and is in the preferred embodiment a thermoelectric unit.

The base panel 19 provides a flat surface to support the refrigeration unit 1. In this form, the base panel 19 is adapted for use on any type of bench or work surface. However, it is envisaged that the base panel 19 could be adaptable for use with a bench surface of a predetermined aspect. For example, the base panel 19 surface may be sloped and/or tailored in some way to allow the refrigeration unit 1 to be positioned on a particular bench surface and/or at a particular angle.

A drain tray 45 also co-operatively engages with the base panel 19 and back wall 7. The drain tray 45 sits beneath the refrigerated air generator positionable in opening 20. The drain tray 45 is adapted to collect any drips, condensation and/or leaks from the refrigerated air generator or created by the operation of refrigeration unit 1 generally. The drain tray 45 is optional and is present on the preferred embodiment to avoid or prevent ponds of water collecting on the bench surface on which the refrigeration unit 1 is placed, but it is not an essential component for operation of the invention.

Figure 4 illustrates an exploded perspective view of the refrigeration unit of Figure 1. As mentioned, the outer refrigeration case 2 of Figure 1 is formed from side walls 4, 5, back wall 7 and front wall 6.

When assembled, the walls 4, 5, 6, 7 are releasably connected to one another and to base panel 19 by known means. The walls 4, 5, 6, 7 and base panel 19 may be connected by clipping together or by an appropriate adhesive as will be known in the art. Walls 4, 5, 6, 7 extend from base panel 19 to form outer refrigeration case 2 and define internal compartment 3 (see Figure 1). Walls 4, 5, 6 are all provided with internal profiles 21, 22, 23 (internal profile 22 is obscured) respectively in Figure 4. The internal profiles

21, 22, 23 are adapted to facilitate chilled air circulation through the refrigeration unit 1. Each of internal profiles 21, 22, 23 includes a longitudinal recess 35, 36 (obscured), 37 respectively which have lower edges 38, 39 (obscured), 40 and upper edges 41, 42 (obscured), 43.

Back wall 7 includes opening 20 which is adapted to receive the refrigerated air generator 44.

Front wall 6 includes an optional display panel 6a which it can be secured to it. This allows additional promotional details to be indicated on the refrigeration unit, but is not essential.

Preferably the walls 4, 5, 6, 7 are formed from a firm rigid material such as formed or moulded plastics material and the like. The advantage of using plastic is that it provides a cheap and readily available and formable material. Plastic is also not very conductive of heat, which reduces heat and/or energy loss from the sides of the refrigeration unit 1. However, the side walls 4, 5, 6, 7 could also be formed in aluminium or other firm or rigid materials which would be adapted to reduce heat loss.

In the preferred embodiment of Figure 4, the thermoelectric unit 44 engages securely with back wall 7 via opening 20. Preferably the thermoelectric unit forms a tight seal with opening 20 to prevent chilled air escaping. Preferably thermoelectric unit 44 also is adapted to engage with a duct 46 via a port 54 as will be described below with reference to Figure 5. The thermoelectric unit 44 is adapted to blow chilled air to the internal compartment 3 (best seen in Figure 5) with the air being directed by duct 46. The drain tray 45 is adapted to catch condensation that may form on or under the thermoelectric unit 44 and, in general, drips created by the refrigeration unit 1 as mentioned above. Whilst the drain tray 45 is optional, it provides a simple and effective way of reducing leaks from the refrigeration unit 1.

The base panel 19 is adapted to allow engagement around its edges with walls 4, 5, 6, 7. Furthermore, the upper surface of the base panel 19 is profiled to assist engagement with duct 46. Although it is not essential that the base panel 19 is profiled, it should be able to form a close contact surface with duct 46. A profiled base panel 19 may also assist drainage of condensation from the internal compartment 3 into the drain tray 45.

The duct 46 is adapted to interact with the base panel 19, the thermoelectric unit 44, and a support tray 47. The duct 46 is provided in a generally U-shaped structure including two arms 48, 49 and a middle section 50. When assembled, bottom edge 51 of the duct 46 engages with the base panel 19, middle section 50 is positioned adjacent to thermoelectric unit 44 and top edge 52 of duct 46 engages with support tray 47.

The middle section 50 of the duct 46 includes an aperture 53 which is adapted to engage with the thermoelectric unit 44. Preferably the thermoelectric unit 44 provides a port 54 to engage with the aperture 53 of the duct 46. It will be appreciated that the particular shape and size of the aperture 53 is tailored to the specific shape and structure of the port 54 of the thermoelectric unit 44. A seal (not shown) may be formed between the aperture 53 and the thermoelectric unit 44 in order to facilitate air circulation throughout the refrigeration unit 1 although positioning the middle section 50 adjacent to the thermoelectric unit 44 is also acceptable.

The duct 46 has a dual purpose. It is adapted to support tray 47 at a predetermined angle. Thus, as shown in Figure 4, the two arms 48, 49 of the duct 46 provide an angled edge 52 which slopes from the middle section 50 toward front wall 6 of the refrigeration unit 1. The angle of the slope may be varied as desired and, of course, may simply lie flat.

When assembled, the generally U-shaped duct 46, together with the base panel 19 and tray 47, divides the internal compartment into four separate compartments. Three compartments are below tray 47 created by arms 48, 49 of duct 46 and are above tray 47.

As mentioned, the duct 46 engages via an upper edge 52 with a support tray 47. The support tray 47 includes three walls 54, 55, 56 and a product support surface 57. Walls 54, 55, 56 include a plurality of vents 58 adapted to channel air over support surface 57 or to receive air in the internal compartment 3. The vents 58 are designed to regulate and direct circulating chilled air from recesses 35, 36 in side walls 4, 5 to various parts of the product support surface and to channel air from the product support surface via vents 58 and recess 37 in front wall 6. Generally, the vents 58 of walls 54, 56 are adapted to direct chilled air onto the product support surface 57 and towards front wall 6. Walls 54, 56 are also optionally adaptable to allow dividers 12 to be affixed in the internal compartments of the refrigeration unit 1.

The invention envisages that the support tray 47 could be adapted so that its walls 54, 55, 56 are not required. However, direction of chilled air over the product support surface 57 is then left solely to skirt 10. This is therefore not a preferred option.

The duct 46 is made of a rigid form of plastics material as would be known to the skilled person but could be formed from steel, aluminium or the like. A resilient or rigid plastics material is preferred.

A rack 59 is also provided in the preferred embodiment illustrated in Figure 2. This allows for better distribution and/or placement of products on support tray 47 in the internal compartment 3. It will be appreciated that the rack 59 is not an essential feature of the present invention. If desired, the rack 59 could be replaced by a stippled or profiled surface across the product support surface 57 of the support tray 47, for example, but such features are not essential.

The support tray 47 and rack 59 are preferably provided in steel, aluminium and/or suitable plastics materials as will be known to the skilled person.

The refrigeration unit is completed by the skirt 10 which includes the profiled surface as described above. The skirt 10 engages with walls 4, 5, 6, 7 when assembled so that it overhangs the walls 4, 5, 6, 7 and directs chilled circulating air. As mentioned, the skirt 10 could be replaced if the walls 4, 5, 6 were adapted to integrally form a skirt.

Figure 5 illustrates a cut-away profile view of the assembled refrigeration unit 1. The internal compartment 3 is divided into four compartments, but only three can be seen in Figure 5, labelled 60, 61, 62. A compartment, obscured in Figure 5 by tray 47, that mirrors compartment 60, is also present. These compartments are formed by a combination of base panel 19, duct 46, and support tray 47.

The arrow A represents the direction of flow of chilled air which has been generated by the refrigerated air generator and is blown into compartment 60 (and the obscured compartment, together referred to as compartment 60) of internal compartment 3. The

arrow B represents relatively warmer air (with respect to chilled air of arrow A) which is returning from compartment 62 into compartment 61.

The chilled air produced by thermoelectric unit 44 is forced into compartment 60 in the direction of arrow A by fans and/or other means present in thermoelectric unit 44 as will be known in the art.

The chilled air enters compartment 62 via recesses 35, 36 in side walls 4, 5 (not shown in Figure 5) in conjunction with the plurality of vents 58 in the walls 54, 56 of support tray 47. The skirt 10 (not shown in Figure 5), together with the plurality of vents 58 of the support tray 47 direct the chilled air down onto the products support surface 57 of the support tray 47. The product support surface 57 of support tray 47 lies along the central longitudinal axis of the recesses 35, 36 (obscured in Figure 5) in walls 4, 5. This allows chilled air from thermoelectric unit 44 to move from compartment 60 to compartment 62.

The air then flows in the general direction of arrows C towards front wall 6. This relatively warmer air then travels through wall 55 of support tray 47 via vents 58 into the longitudinal recess 37 in side wall 6 and down into compartment 61 in the general direction of arrow B. The air then exits compartment 61 via the exit port 54 in thermoelectric unit 45. The vents 58 in the side walls of tray 47 are preferably adapted to direct air flow in the general direction of front wall 6 of refrigeration unit 1. In this way, the efficiency of air flow around the internal compartment 3 of refrigeration unit 1 is increased.

The air which exists in compartment 61 may be either directly exited from the machine or may be recycled by the thermoelectric unit 44 to be rechilled and supplied into compartment 60. The benefit of recycling already substantially chilled air is that it does not require as much energy to bring it to a desired temperature (about 2-14°C depending on the operating temperature of refrigeration unit 1).

A further advantage of the chilled air circulation described is that a "cold sink" is created across the product support surface 57 of support tray 47. When products are positioned on the support tray 47, the chilled air continually passing over the products cools the products. The cooled products in effect insulate the product support surface 57 of the support tray 47. Thus, the surface supporting the products remains cold.

This method of circulating chilled air ensures that the products are kept at a relatively constant temperature without requiring the use of a lid to isolate the internal recess from the external environment. In effect, the circulating air provides an air curtain to isolate the environment of compartment 3 from the external environment surrounding the refrigeration unit 1.

The circulating chilled air has the effect of retaining and preserving the products at a desired temperature. It has also been found that a desirable chilled feeling is experienced by consumers when they place their hands into the internal compartment to select a product.

The thermoelectric unit 44 produces chilled air preferably of a temperature in the range of 0°C to 15°C but preferably 10°C to14°C. At 10°C to 14°C, the shelf life of confectionery products may be extended whilst also providing a chilled and/or firm confection which is desirable to taste, particularly in summer. The temperature may, of course, be varied as desired.

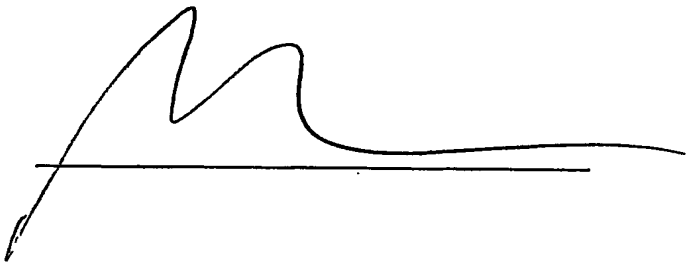
Thermoelectric devices are well known in the art. Their application as the refrigerated air generator in the refrigeration unit 1 provides certain advantages. Thermoelectric devices can be small, and are an energy efficient, quiet and cost-effective means for generating chilled air. They are also reliable and may last as long as 20 years when run about 12 hours per day. A thermoelectric device is the preferred refrigerated air generator in this refrigeration unit 1 as they have sufficient power to generate and circulate air throughout the refrigeration unit 1.

Alternative refrigerated air generators include micro-compressors, also known in the art. However, micro-compressors may be less reliable and may have a shorter life span than a thermoelectric unit. It will be understood that the refrigerated air generator is not limited to thermoelectric units or micro-compressors, but may include any other device which can generate chilled air for the current purpose.

Although the refrigeration unit 1 is not limited to a specific size, where the refrigeration unit 1 is relatively large, the thermoelectric unit may not be the most energy efficient means of generating chilled air. In this case, a standard household refrigerator generator as known in the art may be suitable.

The foregoing describes the invention including preferred forms thereof. Alterations and modifications that would be obvious to the skilled person are intended to fall within the scope of the invention as disclosed.

CADBURY CONFECTIONERY LIMITED
By their Attorneys
Baldwin Shelston Waters



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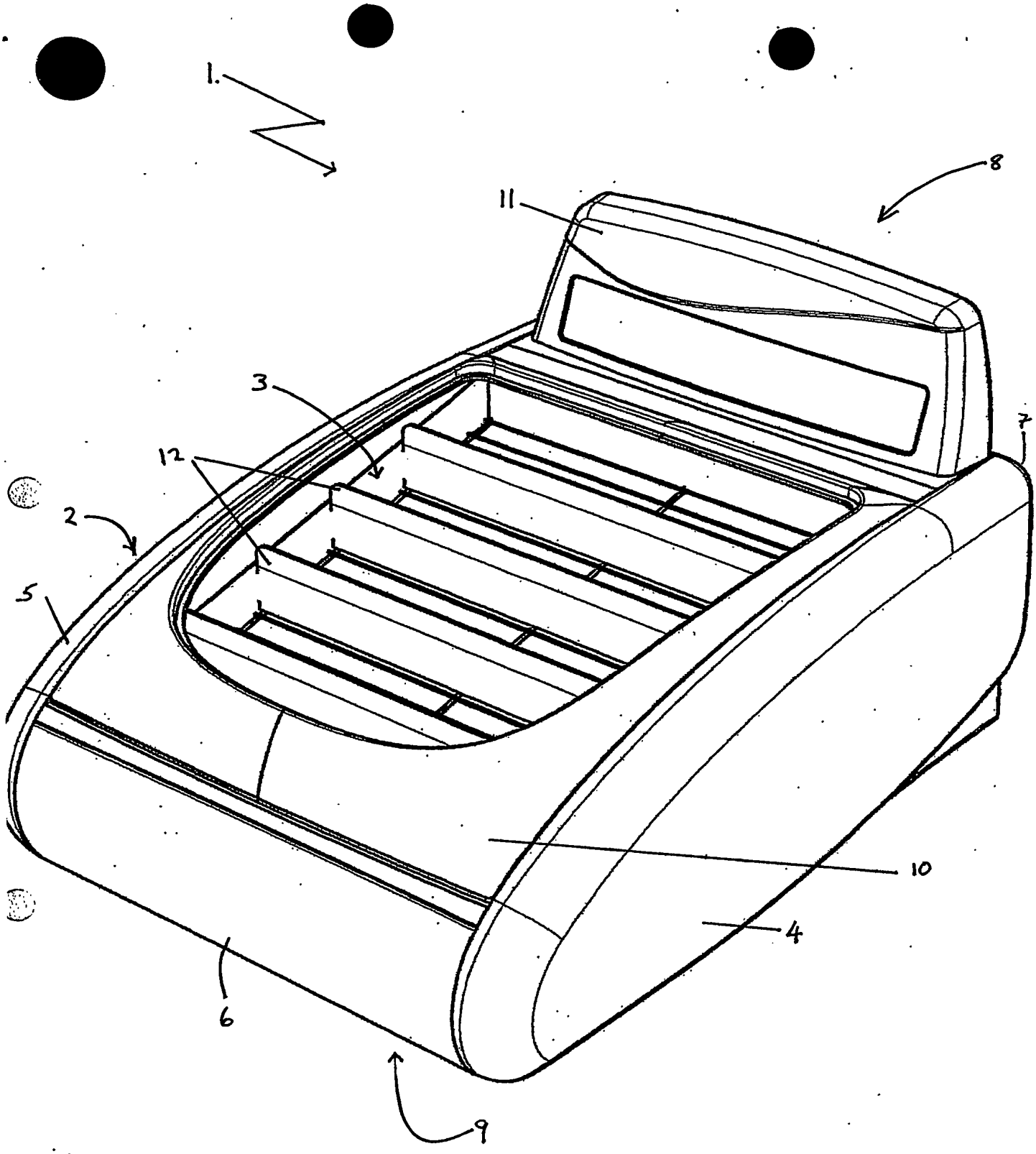

FIGURE 1

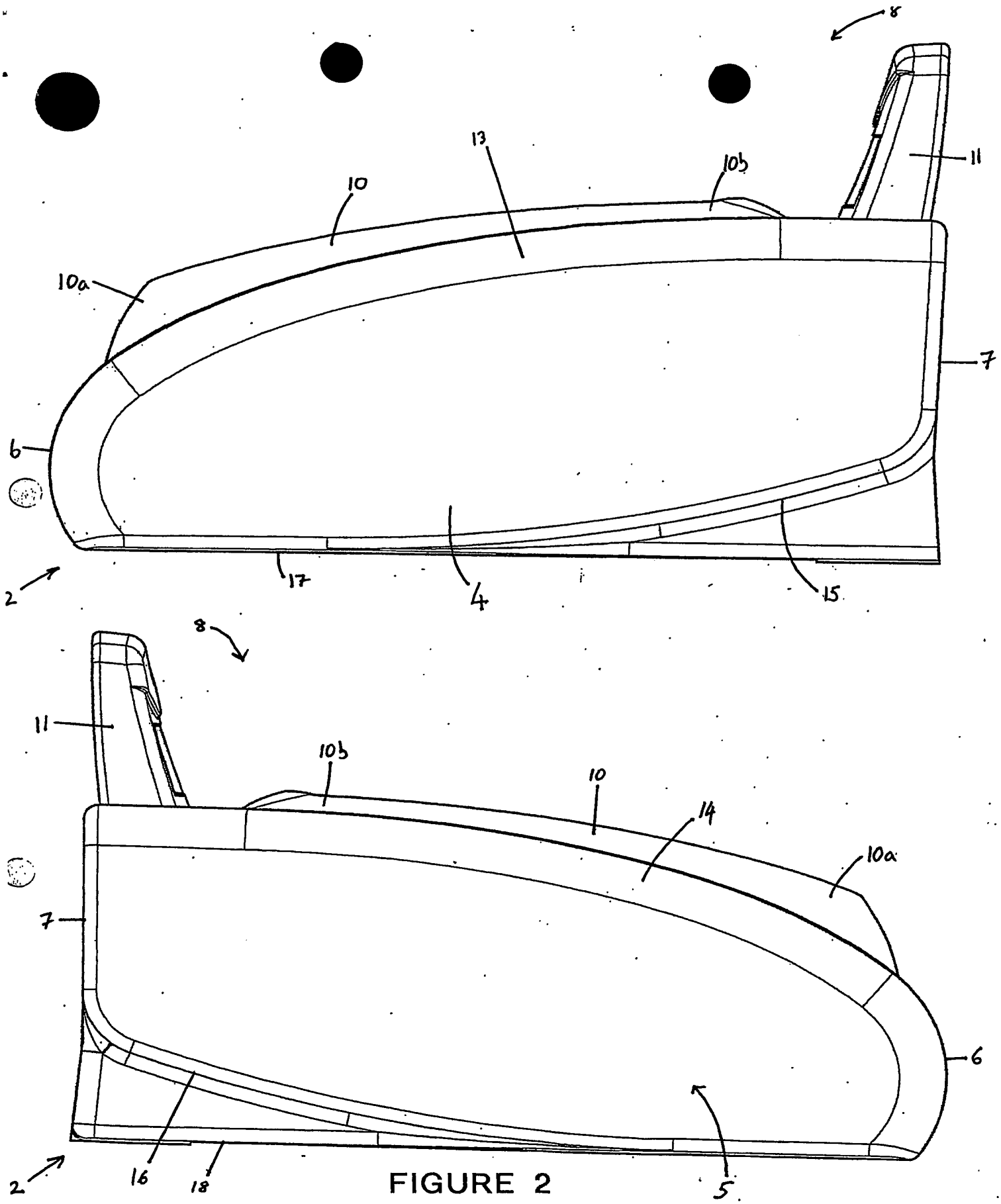

FIGURE 2

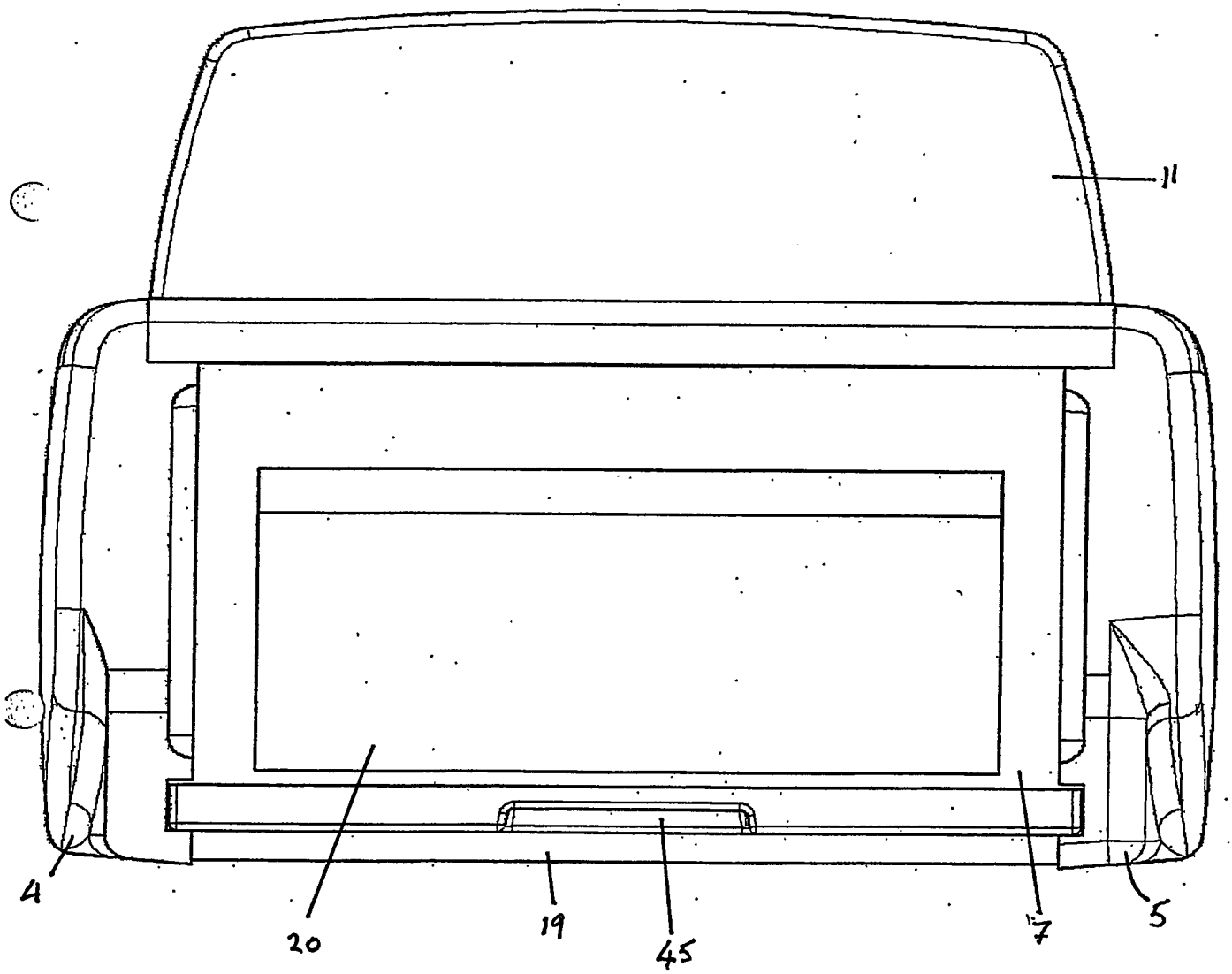

FIGURE 3

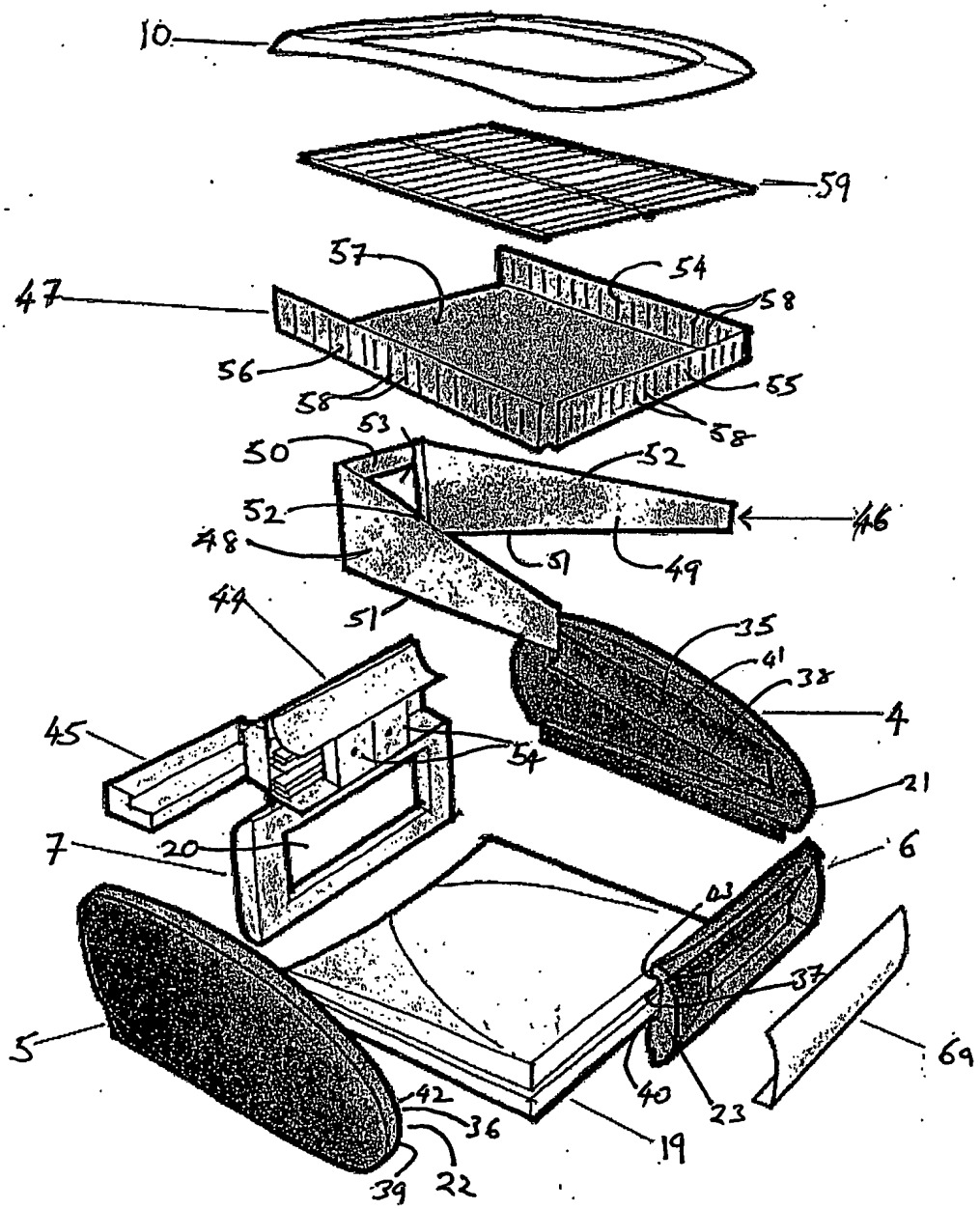
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FIGURE 4

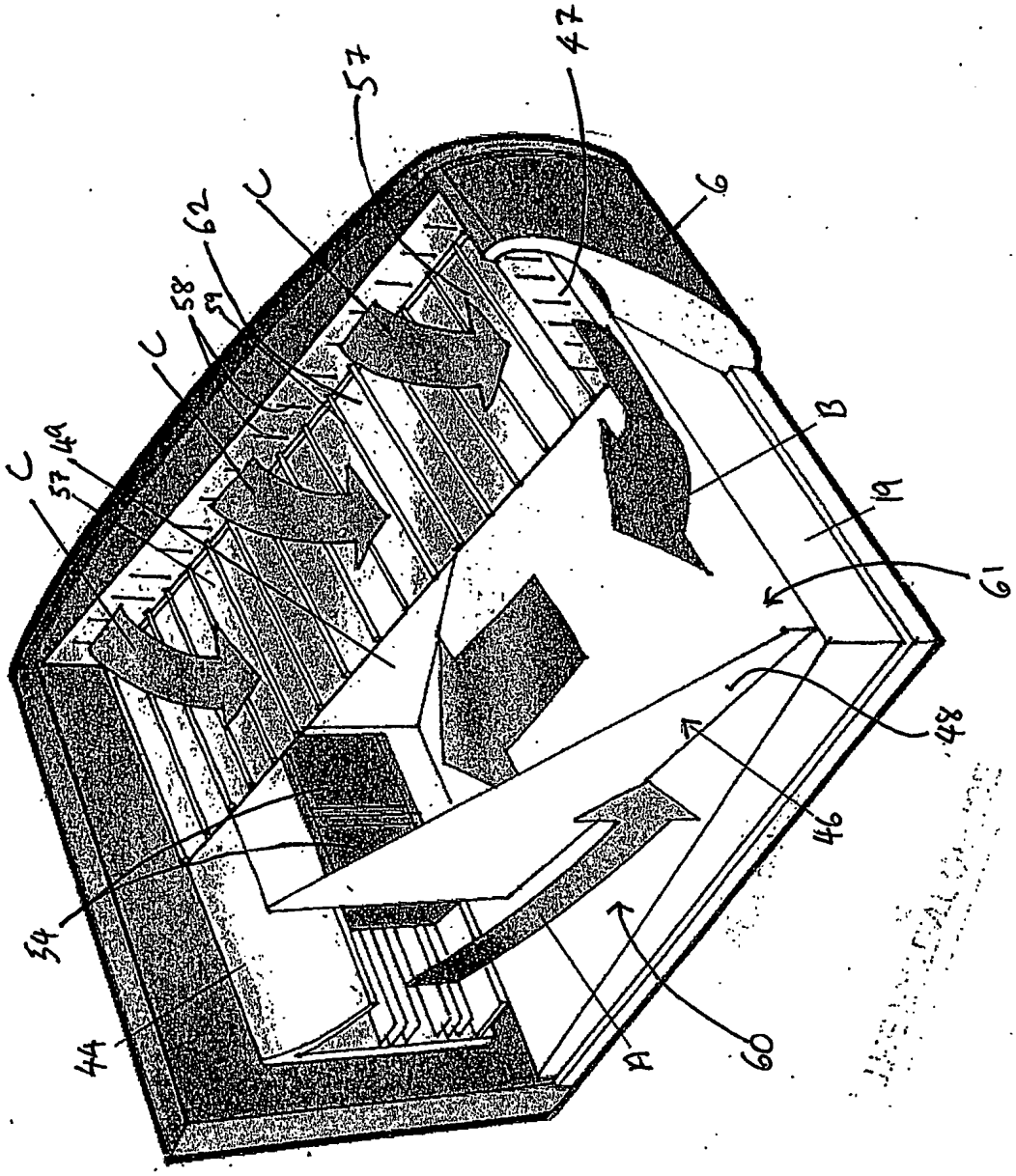

FIGURE 5